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OPTIMIZATION AND EVALUATION OF NONI LEAF SKIN SOFTENING LOTION PREPARATION (*Morinda citrifolia L.)*

Bunga Rimta Barus [1*],Christica Ilsanna Surbakti[2], Salman[1]
[1] Pharmacy Study Program, Faculty of Pharmacy, Universitas Cut Nyak Dhien Medan
[2] Pharmacist Professional Study Program, Faculty of Pharmacy, Universitas Sari Mutiara Medan
*Corresponding author: bungarimtabarus@gmail.com

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ABSTRACT

The premature aging process is usually characterized by visible wrinkles or wrinkles on the face, dry and rough skin, age spots and decreased skin elasticity. Noni leaves (Morinda citrifolia L.) are one type of herbal plant that can potentially act as an antioxidant. The purpose of this study was to see Optimizing the Formulation of Lotion Preparations and Evaluating the Physical Properties of Lotion Preparations. Noni leaves were macerated with 96% ethanol solvent and then rotary with an evaporator. Hand and body lotion preparations were made by adding ethanol extract of noni leaves with several concentrations of 2.5% (F1), 5% (F2), and 7.5% (F3) to the base of hand and body lotion. As a blank (F0) the base of hand and body lotion without ethanol extract of noni leaves. Testing on the preparation was an evaluation of stability for 4 weeks at room temperature (odor, color, pH, emulsion type, homogeneity), irritation test and anti-aging skin activity test using a skin analyzer on hand skin. The parameters measured included water content, pore size, number of blemishes and number of wrinkles. Treatment was carried out using hand and body lotion every day for 4 weeks. Ethanol extract concentrations of 2.5%, 5% and 7.5% were homogeneous preparations with an oil-in-water emulsion type, pH 6.3-6.8, stable in storage for 4 weeks, and did not irritate the skin. Anti-aging skin hand and body lotion preparations containing ethanol extract of noni leaves can increase water content, reduce pore size, reduce the number of blemishes, reduce the number of wrinkles on the skin of the back of the hand and are stable in storage for 4 weeks. Hand and body lotion preparations with ethanol extract at a concentration of 7.5% had better skin antiaging activity compared to concentrations of 2.5%, 5% and blank.

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Introduction

Aging is a natural process that everyone experiences. Premature aging is usually characterized by visible wrinkles on the face, dry and rough skin, age spots/pigmentation, and decreased skin elasticity. Skin aging is a complex biological process influenced by a combination of exogenous and endogenous factors, leading to structural and physiological changes in the skin layers and changes in skin appearance, especially in areas of skin exposed to sunlight (Moini H, et al., 2002).

Antioxidants are compounds that can inhibit reactive oxygen species and free radicals in the body. These antioxidant compounds donate one or more electrons to free radicals, thus restoring normal molecules and counteracting or reducing their negative effects. Antioxidants are divided into two types: primary antioxidants, which are produced within the body, and secondary antioxidants, which are not produced by the body but are derived from food or natural cosmetic preparations containing active compounds. (Bogadenta, A. 2012),

Antioxidants are secondary obtained from various cosmetics that use natural ingredients and contain active compounds that play an important role in antioxidant activity (Surjanto, et al. 2016).

One plant with antioxidant properties is the noni leaf. The noni fruit (Morinda citrifolia L.) is a plant known for its immune-boosting properties, lowering blood pressure, lowering blood glucose, and acting as an antibacterial. Furthermore, the noni leaf (Morinda citrifolia L.) is a plant widely used as a traditional medicine for various ailments.

Materials and Methods

Time and Place

The research period was from June to August 2024. The research location was at the Pharmaceutical Laboratory of Cut Nya Dien University.

Method

This study used an experimental method, and a completely randomized design (CRD) with four treatments and three replications, resulting in 12 experimental units. Each replication consisted of three volunteers. The treatments were as follows: (Sylvia, 2018)

A = 3 volunteers for lotion F0 (blank)

B = 3 volunteers for lotion F1 (2.5% concentration)

C = 3 volunteers for lotion F2 (5% concentration)

D = 3 volunteers for lotion F3 (7.5% concentration)

Work procedures

Test Preparation

All volunteers first measured the initial skin condition of the back of their hands (without treatment) using a skin analyzer device.

Preparation for anti-aging activity testing

The procedure for testing anti-aging activity is as follows:

1. *Moisture*(water content)
    a. By pressing the power button on the moisture checker and waiting until it shows the number 00.0.

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b. Place the moisture checker on the surface of the skin to be measured.
c. The number displayed on the device is the percentage of water content in the skin.

2. *Pore*(Pore)
   a. The method is to use a skin analyzer that has a lens attached to the surface of the skin to be measured.
   b. then press the capture button to take a photo
   c. then the results will automatically appear on the computer screen.
3. *Spot*(Stain)
   a. The method is to use a skin analyzer that has a lens attached to the surface of the skin to be measured.
   b. Then press the capture button to take a photo.
   c. Then the results will automatically appear on the computer screen.
4. *Wrinkles*
   a. The method is to use a skin analyzer that has a lens attached to the surface of the skin to be measured.
   b. Then press the capture button to take a photo.
   c. Then the results will automatically appear on the computer screen.

Results and Discussion

Results

Phytochemical screening of ethanol extract of noni leaves

Below is a table of the results of the phytochemical screening that was carried out on the ethanol extract of noni leaves, namely:

Table 1: Screening results of ethanol extract of noni leaves.

NO	Group	Results
1	Flavonoid	+
2	Alkaloid	+
3	Saponin	+
4	Tannin	+
5	Steroids/Triterpenoids	+

Analysis Results of Hand and Body Lotion Preparations

The results of the analysis of Hand and Body Lotion preparations consist of several observations, namely:

1. Results of homogeneity observations

The following is a table of the results of observations on the homogeneity of the Hand and Body Lotion preparation from ethanol extract of noni leaves.

Table 2. Results of determining the type of emulsion*Hand and Body Lotion*

No	Formula	Methyl blue content in Hand and Body Lotion	
		Yes	No
1.	F0	√	X
2.	F1	√	X
3.	F2	√	X
4.	F3	√	X

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2. Results of observations of the stability of the preparation

The following are observations made on the stability of the Hand and Body Lotion preparation which were carried out for 4 weeks.

Table 3. Observation Results of Changes in the Shape, Color, and Odor of the Preparation

Observation	Preparation	Observation Period (Weeks)			
		1	2	3	4
Form	F0	-	-	-	-
	F1	-	-	-	-
	F2	-	-	-	-
	F3	-	-	-	-
Color	F0	-	-	-	-
	F1	-	-	-	-
	F2	-	-	-	-
	F3	-	-	-	-
Smell	F0	-	-	-	-
	F1	-	-	-	-
	F2	-	-	-	-
	F3	-	-	-	-

3. Results of pH measurement of the preparation

The following is a table of the results of pH measurements of preparations from ethanol extract of noni leaves.

Table 4. pH measurement data for hand and body lotion preparations

No	Formula	Average pH during 4 weeks of storage			
		1	2	3	4
1	F0	6.8	6.8	6.8	6.8
2	F1	6.6	6.6	6.6	6.6
3	F2	6.6	6.6	6.6	6.6
4	F3	6.5	6.5	6.5	6.5

4. Results of the Irritation Test on Volunteer Skin

The results of the irritation test can be seen in the table below, which was carried out on 12 volunteers.

Table 5. Results of irritation tests on volunteer skin

Observation	Volunteer											
	F0			F1			F2			F3		
	1	2	3	4	5	6	7	8	9	10	11	12
Redness	-	-	-	-	-	-	-	-	-	-	-	-
Itchy rash	-	-	-	-	-	-	-	-	-	-	-	-
Swollen	-	-	-	-	-	-	-	-	-	-	-	-

Anti-Aging Activity Test Results

To get good results in anti-aging testing, you can do several things, namely:

1. Moisture content

Below are the data from the results of measuring the water content of hand and body lotion preparations carried out on the skin of the back of the volunteer's hand.

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Table 6. Data from the results of measuring the water content (moisture) on the skin of the back of the volunteer's hand.

	Condition beginning	**Sunday 1**	**Sunday 2**	**Sunday 3**	**Sunday 4**	**% Recovery**
F0	27	27	28	29	29	7.4%
	28	28	29	29	30	7.1%
	26	26	27	28	28	7.6%
Average	27	27	28	28.6	29	7.3%
F1	27	27	29	29	30	15.3%
	28	29	30	31	32	14.2%
	27	28	29	30	30	15.3%
Average	27.3	28	29.3	30	30	14.9%
F2	28	29	31	32	35	25%
	29	30	32	33	35	20.6%
	27	29	31	32	33	22.2%
Average	28	29.3	31.3	32.3	34.3	22.6%
F3	27	29	32	34	36	33.3%
	29	32	34	36	38	31.0%
	28	30	32	34	36	28.5%
Average	28	30.3	32.6	33.6	36.6	30.9%

2. Pore

The following are the results of pore measurements using the Aramo skin analyzer device with a 60x magnification lens and normal reading mode with a blue sensor light color, which were carried out for 4 weeks.

Table 7. Data from the results of measuring the size of pores on the skin of the back of the volunteer's hand.

	Initial conditions	**1**	**2**	**3**	**4**	**% Recovery**
F0	38	38	38	36	36	5.2%
	39	39	37	37	37	5.1%
	36	36	36	36	34	5.5%
Average	37.6	37.6	37	36.3	35.6	5.2%
F1	36	36	34	32	29	19.4%
	39	39	37	34	31	20.5%
	40	38	38	35	33	17.5%
Average	38.3	37.6	36.3	33.6	31	19.1%
F2	39	36	33	29	27	30.7%
	39	37	34	31	26	33.3%
	40	38	36	32	29	27.5%
Average	39.3	37	34.3	30.6	27.3	30.5%
F3	39	35	31	27	23	41.0%
	38	34	31	27	23	39.4%
	41	37	32	28	24	341.4%
Average	39.3	35.3	31.6	27.3	23.3	40.6%

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3. Spot

The results of the measurement of the number of spots were carried out using an Aramo skin analyzer device with a 60x magnification lens and an orange sensor light for 4 weeks and can be seen in the table below:

Table 8. Data from the results of measuring the number of spots on the skin of the back of the volunteer's hand.

	Initial conditions	**1**	**2**	**3**	**4**	**% Recovery**
F0	28	26	26	25	26	7.1
	38	36	36	34	34	10.5
	33	32	32	31	30	9.1
Average	33	31.3	31.3	30	30	8.9
F1	36	35	34	31	29	19.4
	44	43	41	39	36	18.1
	40	38	35	32	30	25
Average	40	38.6	36.6	34	31.6	20.8
F2	36	32	29	25	23	36.1
	36	34	31	28	25	30.5
	42	39	35	31	27	35.7
Average	38	35	31.6	28	25	34.1
F3	40	37	31	26	21	47.5
	36	33	30	25	20	44.4
	37	35	30	25	21	43.2
Average	37.6	35	30.3	25.3	20.6	45.0

4. Wrinkles

The results of the measurement of the number of wrinkles were carried out using an Aramo skin analyzer device with a 10x magnification lens and a blue sensor light for 4 weeks and can be seen in the table below:

Table 9. Data from the results of measuring the number of wrinkles on the skin of the back of the volunteer's hand.

	Initial conditions	**1**	**2**	**3**	**4**	**% Recovery**
F0	43	43	42	42	43	0.0
	45	45	44	44	44	2.2
	42	42	42	42	42	0.0
Average	43.3	43.3	42.6	42.6	43	0.7
F1	45	45	43	41	39	13.3
	44	44	42	41	39	11.3
	43	43	42	41	39	9.3
Average	44	44	42.3	41	39	11.3
F2	43	41	39	28	26	39.5
	44	43	39	29	27	38.6
	42	40	39	29	27	35.7
Average	43	41.3	39	28.6	26.6	37.9
F3	45	41	39	29	25	46.6
	43	39	39	29	24	44.1
	46	42	39	29	25	45.6
Average	44.6	40.6	39	29	24.3	45.4

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Discussion

Phytochemical Screening

Noni is widely used due to its beneficial compounds. Nearly all parts of the noni plant, including the roots, bark, leaves, and flowers, contain various secondary metabolites beneficial to human health, including anthraquinones, alkaloids, flavonoids, scopoletin, terpenoids, octanoic acid, vitamin C, and vitamin A.

Alkaloids can inhibit insect development by disrupting three key insect hormones: brain hormone, edixone hormone, and growth hormone. Furthermore, alkaloids act as anticholinesterases, causing decreased muscle coordination, which can lead to death (Ardiansyah, 2007).

Triterpenoids are secondary metabolic compounds that have the potential to act as insecticides, due to their ability to influence the survival of insects. Triterpenoids can inhibit insect development and cause the insects to remain in the immature stage (Afifah, K. et al., 2017).

Ethanol extract of noni leaves

500 g of noni leaf simple powder was extracted using 4 L of 96% ethanol solvent for maceration, then evaporated with a rotary evaporator at a temperature of 40-50 □ C until a thick extract of 8.23 g was obtained.

Results of homogeneity observations

The results of homogeneity tests on the lotion preparations showed that none of the preparations showed any coarse grains when applied to transparent glass. This indicates that the preparations produced had a homogeneous composition (Directorate General of POM RI, 1979).

Results of determining the type of emulsion preparation

According to the Directorate General of POM RI (1985), the determination of the type of emulsion preparation can be determined using methylene blue dye. If the methylene blue is evenly distributed, it means the preparation is an oil-in-water (o/w) type, but if the color is only blue spots, the preparation type is water-in-oil (o/w).

The results of the emulsion type of lotion preparation in the table show that the methyl blue color can dissolve in the lotion, meaning that the lotion preparation made has an oil-in-water (o/w) emulsion type. This type of emulsion has the advantage of being easier to spread on the skin surface, is not sticky, and is easily removed by washing (Nurlaili, F, et al. 2013).

Results of observations of the stability of the preparation

Based on the results of the shape observations, it was shown that all hand and body lotion preparations produced had good shape and consistency, meaning they did not melt at room temperature. The color of the hand and body lotion did not change. The odor of the preparations remained stable in the room. Storage for 1, 2, 3 and 4 weeks. Observation at room temperature (Tapas, AR et al. 2008).

Results of pH measurement of the preparation

Based on the results of the pH test of the hand and body lotion preparation, it shows that the hand and body lotion preparation without ethanol extract of noni leaves (Morinda citrifolia L.) is 6.8 and the pH of the hand and body lotion preparation using variations in the concentration of ethanol extract of noni leaves is between 6.5-6.6 which shows that the results meet the requirements for a safe cosmetic pH for the skin, namely balanced or close to the pH requirements ranging from 4.5-8 (SNI 4399, 1996). (Nurlaili, F 2013).

Results of Irritation Test on Volunteer Skin

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Based on the results of an irritation test conducted on 12 volunteers, which involved applying a lotion to the skin behind the ear, all volunteers showed negative results for irritation reaction parameters. The parameters observed were redness, itching, or swelling (Mulyawan, D, 2013).

Conclusions

Based on the results of the research conducted, it can be concluded that:

1. Ethanol extract of noni leaves can be formulated into hand and body lotion as an anti-aging product. The best effectiveness is seen at a concentration of 7.5% noni leaf ethanol extract which is able to improve skin conditions, namely the moisture of dehydrated skin returns to normal (30.9% recovery), large pore size becomes smaller (40.6% recovery), the number of blemishes decreases (45.0% recovery) and the number of wrinkles decreases (48.1%).
2. Differences in the concentration of noni leaf ethanol extract in hand and body lotion preparations affect the anti-aging effect. Higher concentrations of noni leaf ethanol extract in the preparation can enhance the anti-aging effect.

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